



SUGAR-COATED DIETS: THE HIDDEN COSTS OF SUGAR

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EXECUTIVE SUMMARY



Solange Le Jeune,
Senior ESG Analyst,
Candriam



Wim Van Hyfte, PhD
Global Head of Responsible
Investments & Research,
Candriam

As responsible investors, Candriam assesses the positioning of investee companies across several categories of factors, health and wellness among them.

The incidence and cost of obesity and other metabolic syndrome conditions have grown at a startling rate over the last fifty years. These now impact people around the world, including emerging markets, and of all ages, including children.

The cost to society is reaching an unbearable level – estimates suggest a full 1% to 2% of world GDP in health costs due to bad diets. The cost is both large, and at the moment, largely hidden. The main cause is unbalanced lifestyles and more specifically, unhealthy diets. Consumption of added sugars and fats has increased dramatically, whilst consumption of fibre has plummeted over the last half century. As of 2016, more than a third of the adult world population is overweight, and 13% obese¹. The game-changer is the discovery that sugar might be the main culprit. Global figures show a statistical correlation between increased intake of sugars and obesity levels. The scientific community has begun to focus on the causes of obesity, and has established an indirect link with the sugar content in modern diets.

National governments are beginning to develop policies and regulations to reduce sugar consumption. The international community is promoting an almost sugar-free diet. The World Health Organisation recommends that the intake of free sugars should be less than 10% of total energy

intake. In 2015, they added a dual recommendation that a further reduction of free sugars to 5% of total energy intake would produce additional health benefits.

As the main source of added dietary sugar is soft drinks and processed food, the beverage and food industries are most at risk. A few national governments are introducing sugar taxes – for example, the UK, Mexico, and India. The sugar itself can also be ‘hidden’ — but regulations are increasingly requiring ingredient transparency. We think this is only the beginning for sugar.

Companies need to adapt to mitigate the negative effects of this developing trend on their profits and market share. This should be seen as an opportunity for corporates to improve long-term growth by behaving responsibly, and by transforming their product range towards healthier options. The United Nations Sustainable Development Goals address nutrition, and this is an opportunity for companies to contribute.

Candriam has been and continues to engage with our investee companies to measure their efforts, and to research company business portfolios and strategies to identify long-term winners. Many have elaborated clear strategies to address sugar risks; some are even taking up improved nutrition as a business opportunity. However, we have found that the companies with the worst positions on our ‘sugar map’ are also the ones least willing to engage or be transparent on the risks.

May, 2019

¹ <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>

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INTRODUCTION AND LANDSCAPE

As part of our fundamental company analysis at Candriam, we analyse sector-specific Environmental, Social, and Governance opportunities and challenges faced by issuers. In the food and beverage industries, health of consumers emerges as a key issue. At Candriam, our fundamental analysis of food companies includes their strategic opportunities to profit from marketing beneficial products, as well as the investment risks of products which detract from the health of consumers. Unhealthy-diet-related medical issues have been debated

for many years, while the impact on healthcare systems and its costs to society are also well known. Food and beverage companies face a changing market and regulatory environment.

New to the debate may be the role of sugar. Also new may be the willingness of regulators to tackle this issue, primarily through additional oversight and regulation of the food and beverage industry. Consumer awareness of the effects of unhealthy diets is also on the rise.

DIET AND METABOLIC SYNDROME DISEASES - A MODERN CHALLENGE

Economic industrialisation and urbanisation trends have brought a radical change in the way we eat.

Industrialisation has not only transformed the way farms operate, it has also brought a change in the type of food available. Food began to be transformed, through industrial processes, before reaching our plates. In addition, food producers have introduced taste enhancers such as salt, fat and sugar to make their products more attractive to consumers. This is contributing to the development of unhealthy diets on a large scale.

In turn, unhealthy lifestyles and diets in modern societies

have led to the **wide-spread increase in metabolic syndrome diseases** (MSDs). The most visible of these is obesity. Other often-chronic non-communicable diseases (NCDs) resulting from poor diets include diabetes, cardiovascular problems, and cancers. According to the October 2018 Fact Sheet of the World Health Organization (WHO), the worldwide incidence of diabetes has risen from 4.7% in 1980 to 8.5% in 2014, and the growth is most rapid in middle-income and low-income countries. According the WHO the number of obese children and adolescents (aged five to 19 years) worldwide has risen tenfold in the past four decades (WHO news release 11 October 2017).

Metabolic syndrome is a cluster of metabolic disorders that increases the risk of developing cardiovascular disease and type-2 diabetes. It is defined as occurring when an individual presents three or more of the five following medical conditions:

- Abdominal obesity
- High blood pressure
- High blood sugar
- High serum triglycerides
- Low high-density lipoprotein (HDL) level

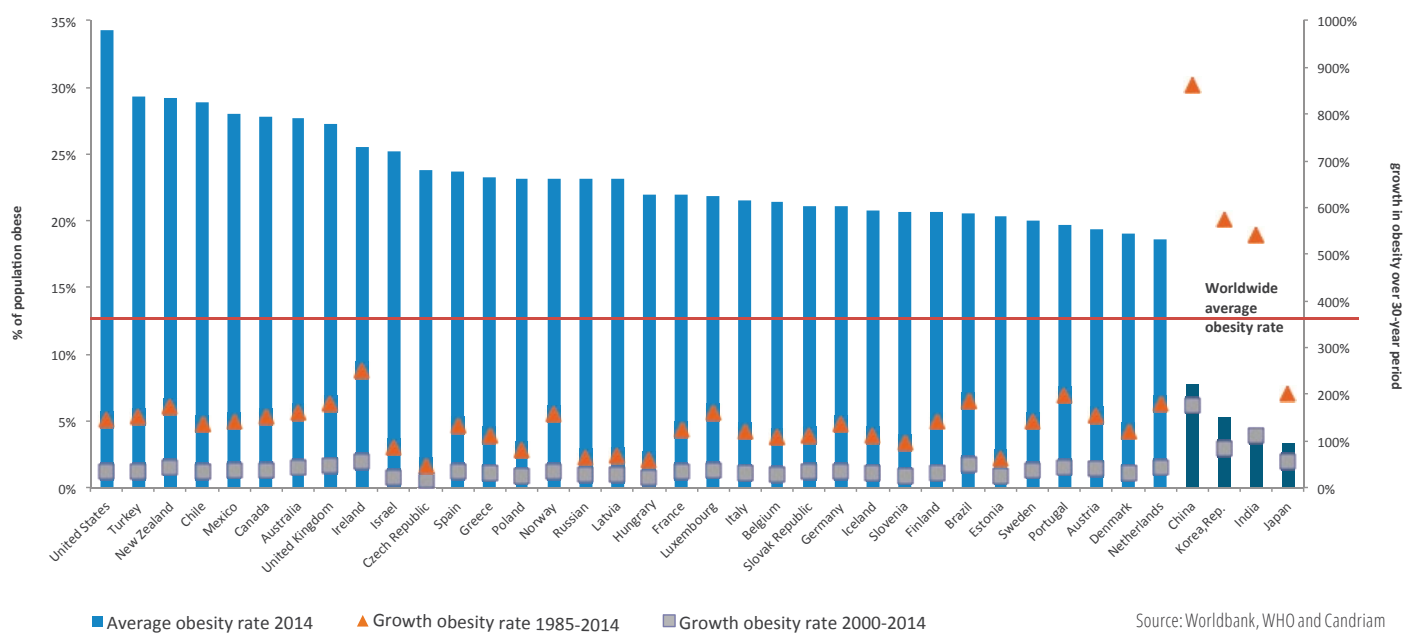
Calorie consumption around the world has increased by approximately 25% per capita on average over the past 50 years². Beyond the higher calorie intake which may have been necessary in some regions, the United National Food and Agriculture Organization — FAO — highlights the shift “towards a higher energy density diet with a greater role for fat and added sugars in foods, greater saturated fat intake (mostly from animal sources), reduced intakes of complex carbohydrates and dietary fibre, and reduced fruit and vegetable intakes”³.

HIDDEN COSTS

At the same time, obesity has increased at an alarming rate. The WHO defines 'overweight' as a Body Mass Index of 25 or more, and obesity as a BMI of 30 or more. Chart 1 shows the average obesity rates amongst OECD and developing countries. In the US, 35% of the population was defined as obese by the OECD, as of 2014. This represented a 687% increase between 1985 and 2014. According to the WHO Key Facts, worldwide obesity has

tripled since 1975, there were around 2.3bn obese people in 2016⁴. A Lancet study said: "Worldwide, the proportion of adults with a body-mass index (BMI) of 25 kg/m² or greater increased between 1980 and 2013 from 28.8% (95% UI 28.4–29.3) to 36.9% (36.3–37.4) in men, and from 29.8% (29.3–30.2) to 38.0% (37.5–38.5) in women⁵". A quarter of the world population could be obese by 2045, according to the WHO⁶.

CHART 1: Average obesity rates amongst OECD and Developing countries



*Body mass index (BMI) refers to the weight in kilograms divided by the square of the height in meters (kg/m²). This index is commonly used to classify overweight and obesity in adults. WHO defines overweight as a BMI equal to or more than 25, and obesity as a BMI equal to or more than 30.

² FAO, source: <http://www.fao.org/docrep/005/ac911e/ac911e05.htm>

³ <http://www.fao.org/docrep/005/ac911e/ac911e05.htm>

⁴ <https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight>

⁵ Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013, The Lancet. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(14\)60460-8/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(14)60460-8/fulltext)

⁶ L'Organisation mondiale de la santé (OMS) estime qu'environ 13% des adultes (11% des hommes et 15% des femmes) étaient obèses en 2016. Selon les projections faites par des chercheurs danois et britanniques, cette proportion grimpera à 22% en 2045 si rien ne change d'ici là.

Children are heavily targeted by advertising for foods and sugar-sweetened beverages (SSBs). We use other definitions of overweight, and obese, for children, but they have been impacted equally, if not more. Given that tastes are developed during youth, the targeting of children through advertising campaigns is particularly harmful to life-long obesity trends, and particularly efficient for companies from a marketing and brand loyalty point of view.

The cost to society is unbearable; yet it continues to rise. This is *not* a rich country issue, as demonstrated by obesity rates across the world. The problem goes beyond healthcare costs:

- The human cost of MSDs includes 2.8m adult deaths per year according to the WHO⁷.
- Indirect economic impacts include lost productivity, e.g. absenteeism, presenteeism, reduced dexterity; and reduced workforce, as sick employees may stop working prematurely.

• Healthcare cost estimates vary:

- Some estimates are that obesity accounts for 2%-7% of global health care⁸,
- In France, for instance, obesity costs €20bn, or 1% of the country's entire GDP⁹.
- Where estimates for total costs of obesity, diabetes and all NCDs in general exist, these range between 1%-2% of each nation's GDP¹⁰. Diabetes and obesity are known to be closely correlated. Obesity is the most potent risk factor of diabetes, estimated at 80-85% of the total risk of developing type-2 diabetes.

THE ROLE OF SUGAR — A RISING AWARENESS

There is increasing evidence that sugar might be a main cause of obesity, while previously, dietary fat had been the main culprit. In chart 2, a simple analysis of sugar intake and obesity levels seems to indicate a link.

The data used in the chart shows the correlation between sweetener intake and obesity rates in the US over a 40-year period.

CHART 2: Obesity rate in the US and consumption of caloric sweeteners (pounds per capital)



Source: WHO, USDA Economic Research Service, Candriam

⁷ http://www.who.int/gho/ncd/risk_factors/obesity_text/en/

⁸ WHO, WHO Technical Report Series 894, <http://www.iuns.org/resources/the-global-challenge-of-obesity-and-the-international-obesity-task-force/>

⁹ Trésor-Economics No.179 (September 2016), "What are the economic consequences of obesity and how to tackle them?"

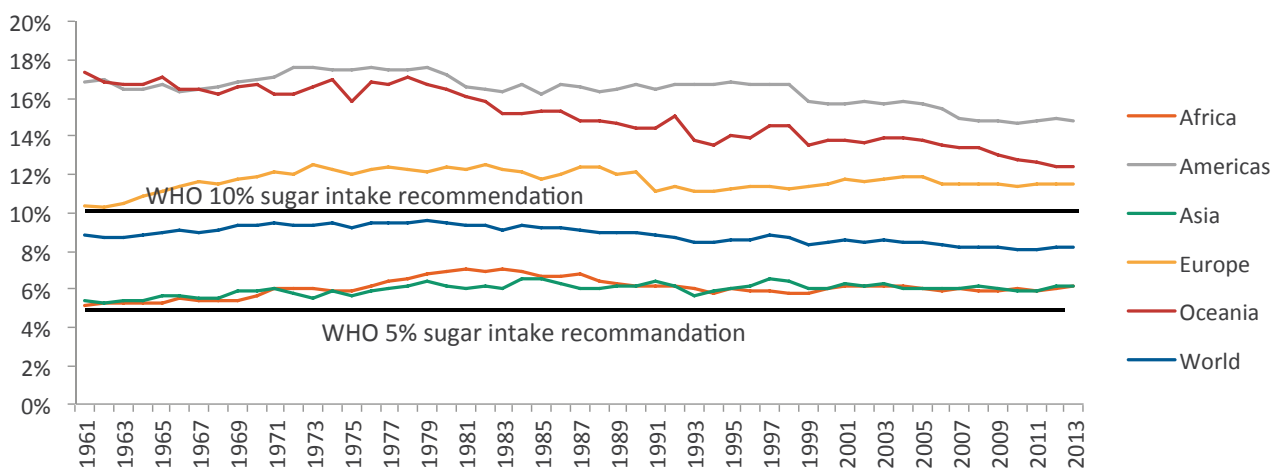
¹⁰ MS, The Bitter Aftertaste of Sugar. This range is based on studies in the US, UK, the EU and Australia

Recent research studies have established a link between sugar consumption and metabolic syndrome diseases and diabetes, emphasising sugary drinks.

The best evidence comes from the WHO. The Organisation commissioned a review of the scientific literature, to address the effects of sugars. The result suggests that intake of sugars was a determinant of human body weight¹¹. The WHO also refers to a meta analysis assessing the effect of sugar-sweetened beverage consumption on weight gain of children and adults.

Its results indicated that BMI increased by 0.07 for each additional daily 12 ounce serving (340 grams) of sugar-sweetened beverage over the durations specified in the studies¹². Although those research studies do not yet demonstrate a direct causal link between sugar consumption and obesity, there is no denying that the large increase in sugar consumption has contributed. The WHO concludes: "The evidence for a link between sugar-sweetened beverage consumption and childhood obesity is compelling. Further evidence continues to emerge."¹³

CHART 3: Sugar and Sweeteners as percentage of total calorie intake



Sources: UN Food and Agriculture Organization – FAO, accessed Feb 2019; Candriam

Governments and citizens are beginning to recognize the health issues associated with sugar consumption. Momentum is gathering amongst national regulators and public health agencies to tackle the sugar issue.

In 2015, the WHO updated its sugar intake recommendation: in both adults and children it still recommends reducing the intake of free sugars to less than

10% of total energy intake; however its is now suggesting a stricter reduction to below 5% for additional health benefits.

In all geographic regions consumers take more added sugars than recommended by this new guideline (chart 3).

¹¹ Te Morenga, L., Mallard, S. & Mann, J. 2013. "Dietary sugars and body weight: systematic review and meta-analyses of randomised controlled trials and cohort studies."

¹² http://www.who.int/elena/titles/commentary/ssbs_childhood_obesity/en/, refers to Malik VS, Pan A, Willett WC, Hu FB. Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. American Journal of Clinical Nutrition. 2013

¹³ http://www.who.int/elena/titles/commentary/ssbs_childhood_obesity/en/

TRACKING SUGAR — INDUSTRIES AND IMPACTS

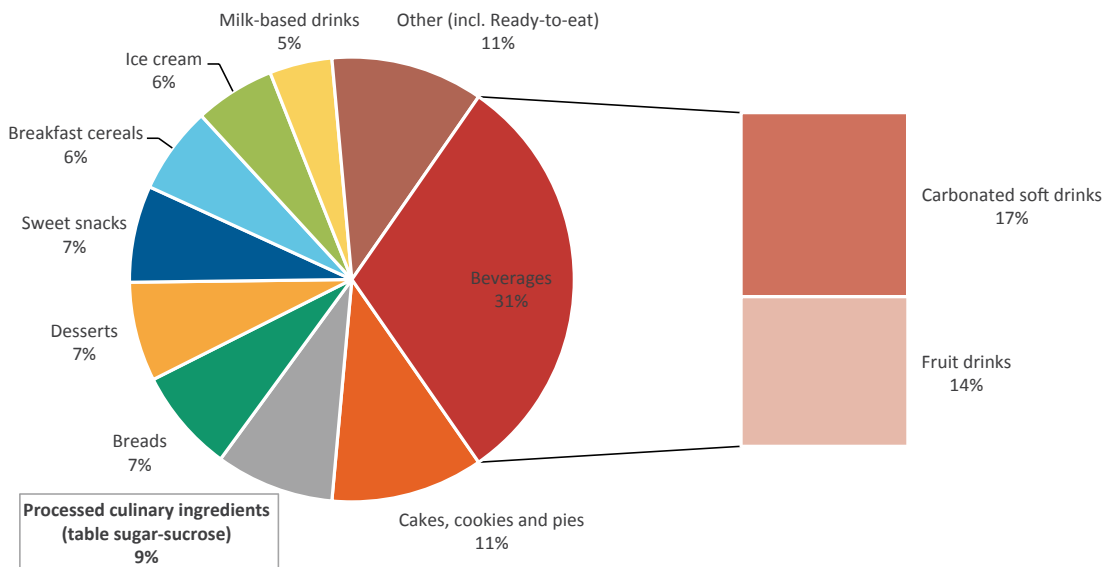
HIDDEN SUGAR: BEVERAGES AND PROCESSED FOODS AT THE FOREFRONT

Almost 90% of the daily intake of added sugar in the USA is from ultra-processed foods, according to research by Martinez Steel and others¹⁴. The researchers found that “the content of added sugars in ultra-processed foods was eight-fold higher than in processed foods, and five-fold higher than in unprocessed or minimally processed foods and processed culinary ingredients grouped together. They used their own definitions of processed food as there is no universal definition. For a better understanding of what processed

food means, we have detailed the NOVA definitions below (see ‘what is processed food, p.9) – this is the most widely accepted.

Beverages provide more than 30% of the US added sugar intake, according to the Martinez Steele data (chart 4). **Other ultra-processed foods such as ready-to-eat, breads, breakfast cereals, milk-based drinks**, often not considered as sweet foods by consumers, account for an additional 38% of the intake of added sugars.

CHART 4: Mean energy intake from added sugars in the US population



Sources: Martinez Steele et al, and Candriam

The main providers of sugary foods and drinks are food and beverage and food retail companies such as supermarkets; and thus they are central to this debate. As regulators began to track the origin of sugar in diets it became quickly obvious that processed foods and soft

drinks were particularly heavy sources. **Added sugars are mostly ‘hidden’ in processed foods, sometimes in the form of starches**¹⁵. As for beverages, studies of soft drinks show a correlation between increase consumption of sodas and obesity rates.

¹⁴ Martinez et al, Ultra processed foods and added sugars in the US diet: evidence from a nationally representative cross-sectional study, BMJ, 2015

¹⁵ A carbohydrate extracted from plants. The molecule is made of many glucose units joined together. It is extracted from potatoes, wheat and maize, and can be converted into a sweetener through a process called hydrolysis. Starches are also used to bind, give texture and stabilise food.

WHAT IS PROCESSED FOOD?

Food classifications systems, defining raw versus processed food, vary from one country/region to another and among users. They usually classify food types into three or four categories: from minimally or unprocessed foods (raw foods); to modestly processed such as food prepared or packed in an industrial process; and processed, which has been transformed using several ingredients and techniques.

One global classification system, NOVA, is widely-used and more comprehensive than others: NOVA clearly differentiates methods of industrial and artisanal/domestic types of processing. It is a useful tool to understand the main differences between non processed, processed and ultra-processed foods:

1. **Unprocessed and minimally processed foods:** Foods of plant or animal origin; foods altered in ways that do not add or introduce substance, but that may involve subtracting parts of the food in ways that do not significantly affect its use. For example, vacuum-packed vegetables, rice, or dried fruits.
2. **Processed culinary ingredients:** Food products extracted and purified by industry from constituents of foods, or else obtained from nature such as salt. For example, plant oils, sugars and syrups, and uncooked pasta.
3. **Ready-to-consume products:**
 - Processed food products: Manufactured by adding substances such as oil, sugar or salt to whole foods, to make them durable and more palatable and attractive. For example, canned or bottled vegetables and legumes or pulses preserved in brine; peeled or sliced fruits preserved in syrup; tinned whole or pieces of fish, un-reconstituted processed meat and fish such as ham, bacon, smoked fish cheese
 - Ultra-processed products: Formulated mostly or entirely from substances derived from foods; typically contain little or no whole foods. Typically not recognizable as versions of foods, although may imitate the appearance, shape, and sensory qualities of foods. Some ingredients directly derived from foods, such as oils, fats, flours, starches and sugar. Others are obtained by further processing of food constituents. Numerically the majority of ingredients are preservatives; stabilizers, emulsifiers, solvents, binders, bulkers; sweeteners, sensory enhancers, colors and flavors; processing aids and other additives. Designed to be consumed by themselves, displace food-based freshly prepared dishes. Processes include hydrogenation, hydrolysis, extruding, molding, reshaping; pre-processing by frying, baking.

(Definitions are adapted from *Food classification systems based on food processing; significance and implications for policies and actions: a systematic literature review and assessment* by Moubarac, Cannon, Parra and Monteiro, Article June 2014

Given the ‘hidden’ nature of sugar in processed foods and beverages, the market backlash could be strong when consumers realise the contents of the mainly processed foods they are purchasing.

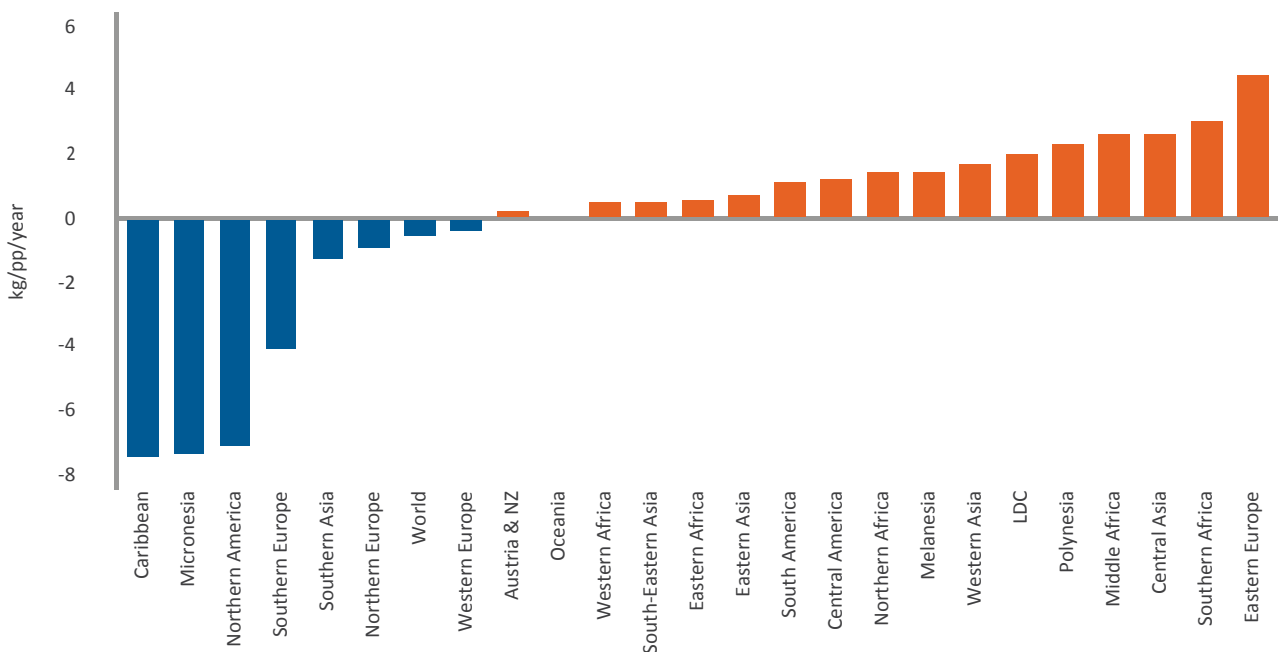
We also expect regulators to pressure the industry to address the sugar content of processed foods. This will have direct consequences on the food and beverage sectors and potentially on food retailers.

- **Increasing Regulation.** We expect governments and national health agencies to crack down on the food and beverage industry and food retailers through tightened rules and standards. **Sugar taxes** are becoming more frequent, as well as food labelling requirements – these can impact both manufacturers and retailers. Sugar taxes are already in place in a number of European countries, including Norway, Denmark France, Finland, Hungary, Latvia, as shown in chart 6, and in a few US states. The UK and Ireland are also introducing a tax on sugary beverages. A few examples have appeared in emerging markets, such as Mexico and India¹⁶. **Food labelling** requirements

are becoming more precise and informative. Labelling laws can address the ‘hidden’ ingredient issue. Labelling standardisation is increasingly popular among consumers, who demand clearer food nutrition information. The Australian Department of Health is working on a new system to better-label ingredients, such as ‘added sugar’ on food packaging. Better nutrition labelling may actually provide an opportunity to attract new customers. Regulations may also address **advertising** and **product portions**; New York City made a first tentative step to ban large portions of sweetened drinks in 2012.

- **Consumer Trends.** Driven by Millennials, consumers are increasingly concerned over the quality, safety and sourcing of their food. The realisation that processed food might be linked to health issues through sugar content will not be without consequences for the industry. The demand for healthy products will continue to rise, and more particularly new shopping habits to avoid sugar.

CHART 5: Regional changes in sugar consumption



Sources: The Bitter Aftertaste of Sugar – March 8 2015, Morgan Stanley

¹⁶ Sweetened aerated beverages taxed at 40% vs. 12% for fruit juices.

IMPACT ON BUSINESSES

How can companies address the effects of these regulatory and consumer trends? Companies need to update products and marketing practices to address both consumer demand for ingredient transparency and new standards by regulators. Advertising to children, and well-being claims, will need to be reviewed. Packaging and labelling will need to be updated, and could become business opportunities for companies to position themselves for the transparency and small portion market

segments. However we view these efforts as insufficient to fully meet the increasing regulatory cost as consumers increase their awareness of the food-health nexus. Consumers have only just begun to reduce their consumption of sugar, as demonstrated in Chart 5, showing regional changes in sugar consumption. We believe there is a long way to go. Companies will need to reformulate their products, incurring product development and re-launch costs, and re-position their offers towards healthier ranges.

Business Risks	Industry changes	Business Opportunities
Decrease in sales and loss of market share for traditional products	Consumer trends Demand for healthier/low sugar content products	Healthy brands: gain in market share Traditional brands: Repositioning with healthy ranges
High product development cost might hit profitability in the short to mid-term	New product development Reformulation costs R&D and marketing costs	Retain or increase market share (mid to long term)
Decrease in sales and loss of market share for traditional brands Impact on reputation and brand value	Regulations, norms and standards Labelling Clear ingredient information Advertising claims	Healthy and transparent brands: gain in market share Enhance brand value when products are repositioned
Loss of market share or declining profitability	Sugar tax Cost may be passed on to consumer	Healthy brands: market share gain

REPUTATIONAL RISK

The food industry has not fully acknowledged its responsibility on the sugar issue. Some industry-funded research is denying the growing scientific evidence of a link between sugar and obesity which has been cited in independent research (Reuters Health, "Industry funded studies don't find sweet drinks linked to obesity"¹⁷).

This is the riskiest business strategy, in our view. Our analysis shows consumer awareness is already rising. Consumers are recognizing the impact of unhealthy diets, while governments need to fund increasing healthcare costs. The longer the industry persists in current products and practices, the worse the reputational damage will be. Companies seizing the revamp potential of their product offering will not only meet consumer needs but also build stronger brand reputations.

¹⁷ <https://www.reuters.com/article/us-health-research-beverages-diabetes/industry-funded-studies-dont-find-sweet-drinks-linked-to-obesity-diabetes-idUSKBN12V2J1>

IS THERE A LITIGATION RISK?

What if producers of hidden high-sugar-content processed food are made responsible for the societal health-care costs? Could we see litigation against food and beverage companies? The tobacco industry spent billions to settle with consumers and governments, including compensatory damages to victims of long-term smoking. For tobacco, the proofs of a direct relationship with non-communicable diseases are well-established. However, there are some similarities between tobacco and sugar, such as addiction to the product. We are yet to see major lawsuits or large settlements; however, sugar

or “the new tobacco” may be a dormant threat to the sector. A recent example is the lawsuit filed against Coca-Cola in January 2017 by two non profit organisations; it argues the company and the American Beverage Organisation, an industry-funded trade association, have deceived the public on the health risks of these products. This is not the first time Coca-Cola has faced such a lawsuit; however, it paid no damages in the past. Any recognition of responsibility could set a precedent, laying the ground for further litigation cases against the industry going forward.

THE REGULATORY RISK IN ACTION

In 2016, the WHO urged all countries to adopt a tax on sugary drinks, proposed as an effective way of curbing the soaring obesity rate in children. A single can of soda can contain as much as 10 teaspoons of sugar, according to the WHO, more than the maximum recommended daily intake of 6 teaspoons of free sugar¹⁸. Many countries already had, or have since, introduced sugar taxes.

(See UK and Mexico case studies in the text box.) Typically, these taxes are indeed tackling sugary drinks. As some of those policies showed positive results, the moves have inspired many more governments. We see growing momentum to regulate against sugar, and growing cost impact for companies.

- **UK Sugar Tax Business Implications.** Recently the UK introduced a sugar tax on soft drinks. Initially in 2016 the UK Office for Budgetary Responsibility (OBR) forecast a 0.8%-1% reduction in demand for sugary drinks for every 1% rise in price as a result of the new levy. Before it came into force on the 6th April 2018 companies had started to reformulate to mitigate the effects of the tax – soda manufacturers in particular, including brands such as Fanta, Ribena, and Lucozade. Following the reformulations, the OBR predicted only half the revenue it had initially forecast (£500m), indicating much reduced expected sugar intakes by consumers.
- **Mexico Sugar Tax Effects.** Mexico introduced a sugar tax in 2014. By the end of the first year, Mexicans were consuming 12% fewer sugary beverages. Importantly, the greatest reduction was among the poorest families. The beverage industry in Mexico has also diversified and reformulated their product portfolio. “In the last six years, the calorie content of the products has been reduced by 7%. As a result of our reformulation efforts, there are products with up to 50% reduction in caloric content” (<https://www.foodbev.com/news/lessons-mexico-sugar-tax-hasnt-worked-says-beverage-association/>)

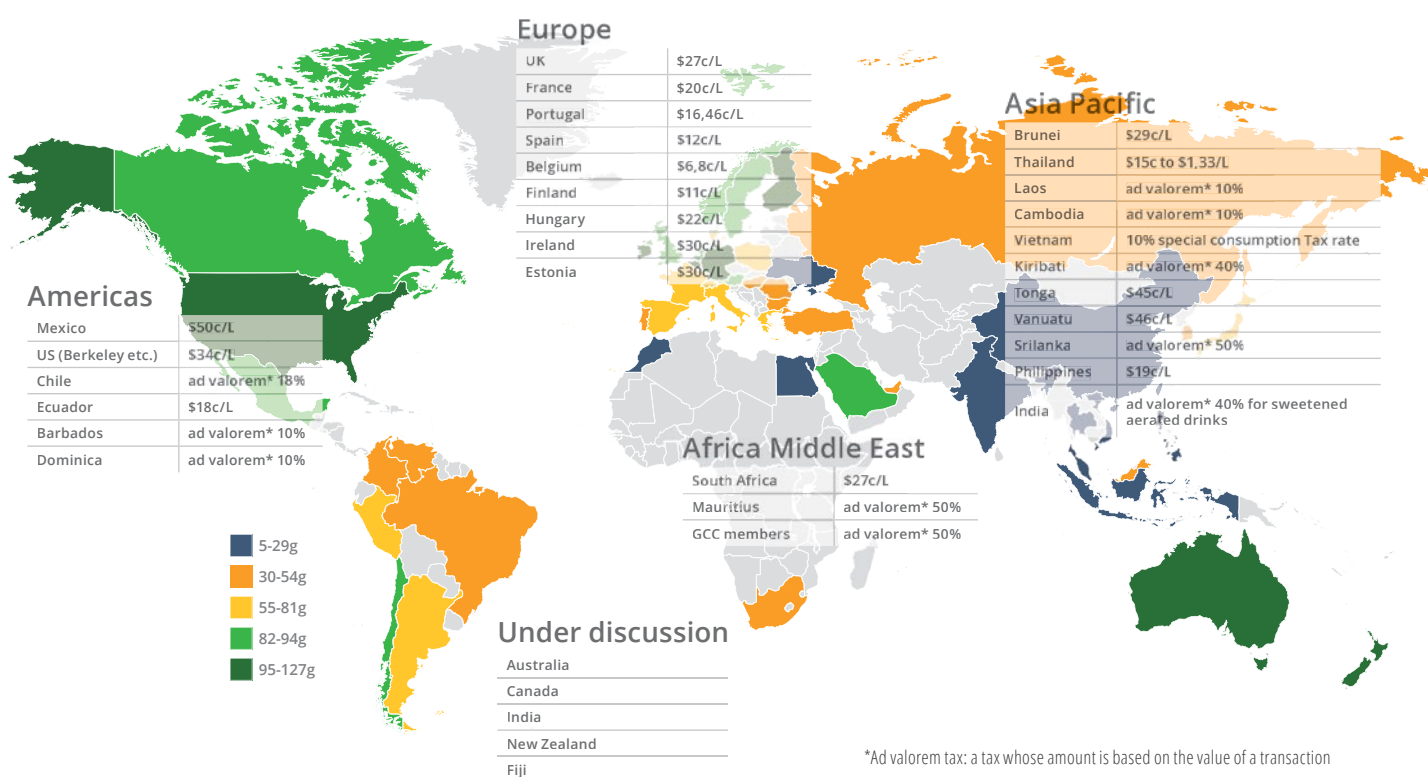
¹⁸ <http://www.who.int/mediacentre/news/releases/2015/sugar-guideline/en/>

The map in Chart 6 illustrates regions and countries where sugar taxes have been implemented. Most of the time, sugar taxes have targeted sweetened beverages, however sugar taxes on sweet food are emerging. As and

if sugar tax on drinks continue to deliver positive results as we have seen in Mexico or the UK, we believe that over sugar-related regulation will become a long-term trend, and will impact other product ranges.

CHART 6: World map of sugar consumption and sugar taxes¹⁹

Map colours show sugar consumption per capita in 2015
Tables describe sugar taxes within regions



Several additional sugar tax proposals are in the pipeline, beyond those already in place, demonstrating the regulatory momentum.

- Australia has among the ten highest levels of soft-drink consumption in the world. Per capita sales of ‘sugar-sweetened beverages’ (SSB) reached nearly one per day in 2014 (Lancet medical journal research), higher than in the UK. In a 2018 statement on nutrition, the Australian Medical Association urged the government to introduce an SSB tax.

- Canada shows among world's highest obesity rates (almost 15% of Canadian boys in 2016 were obese). Simultaneously, Candian consumption of sweetened drinks has increased by 638% over the last 10 years. The political debate here includes sugar tax on beverages. The Northwest Territories have already announced their intention to introduce a sugar tax.

¹⁹ <https://www.hcs.harvard.edu/hghr/online/sugar-dilemma/>

CANDRIAM ANALYSIS OF SUGAR RISK IN THE BEVERAGE AND FOOD SECTORS

Candriam analysts are taking a view on the sugar exposure of companies in our portfolio. We present a research framework for sugar, which we identify as an emerging business risk in the food and beverage sector. We think this approach can be replicated to assess exposure to other nutrition and wellness-related topics.

This is a dynamic framework. Scores are meant to evolve as company business models, markets and regulation evolve.

PRODUCT PORTFOLIO AND GEOGRAPHIC EXPOSURE

An Analysis of a Company Product Portfolio and Geographic Exposure to Sugar Regulatory Costs

Geographic exposure: The world map of sugar consumption and sugar taxes in chart 6 exhibiting sugar consumption and local regulatory trends is helpful in the assessment of exposure to sugar risk. Americas, Europe and Australia (AEA) stand out as markets with the most severe obesity issues and as countries where, in our view, governments are more prone to regulate. Additional elements in these regions include the cost of obesity to public healthcare systems, and existing track records of nutrition regulation. Despite the implementation of sugar taxes in a few Asian countries, regulatory signals are less strong there, and

obesity rates remain relatively lower; we conclude that the Asian regulatory risk is not currently as high as in AEA. For instance, in large emerging markets such as China and India, sugar consumption per capita remains lower. In the Middle East, although obesity rates are also high, we consider the risk less than for AEA, as the Middle East does not have a history of much nutritional regulation.

We have developed a 'geo score', our measure of company exposure to the high-risk AEA markets, to assess companies' geographical exposure sugar regulation.

Company geographic score [0-100]:

A detailed geographic revenue breakdown, or geo score, is part of our responsible investment research framework as we aim to capture country- and region-specific investment opportunities. For the sugar issue, we have estimated our investee companies' sales exposure to the three flagged AEA markets (North and South America, Australia, Europe) to assess their overall exposure to the sugar regulatory risk. The higher their exposure to these markets in percentage terms, the higher the 'geo score'. Thus our geo score is a risk measure.

High % of sales derived from high risk markets



Low % of sales derived from high risk markets

Company Sugar factor [0-100]:

We analyse the produce portfolios of Food and Beverage companies by type of foods. Each type of food has been attributed a 'sugar factor' [0-100] to reflect its added sugar content). This is weighted by the proportion of revenues derived from the product type, so that each company receives an overall sugar factor score. Plotting exposure to high risk geography, or geo score, with high risk products, or sugar factor score, we have identified a few companies which deserve the bulk of our attention as investors. These companies are our engagement targets on the topics of their nutrition and sugar management practices.

Our Candriam sugar factor ranking:

Sugar concentration ↑	Drinks	100	Sugar factor
	Confectionary	80	
	Sweet/Biscuits	70	
	Dairies and ice creams	60	
	Processed foods	60	
	Bakery cereals	50	
	Sports nutrition	50	

Source: Candriam

Sugar in the product portfolio: The product portfolios of Food and Beverage companies are rarely assessed beyond the metrics of profitability and growth. However we believe that nutrition is an underlying driver for future growth and profitability. Our goal is to anticipate this trend and assess whether companies are positioned to address nutritional challenges. **We have assessed companies' product portfolios qualitatively in regards to**

their added sugar content. Unsurprisingly, **confectionary and carbonated drinks companies come highest on our sugar risk ranking** (Dr Pepper, Coca-Cola, Monster, Lindt, Barry Callebaut, Mondelez). We think companies offering **processed foods are also at risk.** Our sugar ranking helps us to assess which product portfolios are more, or less, sustainable.

Note that we are assessing added sugars; sale of sugar as an ingredient, such as cane sugar or high-fructose corn syrup as an ingredient, such as Tate & Lyle or Archer Daniels Midland, is not 'hidden' in a processed product.

CHART 7: Food companies exposure to sugar regulation vs. portfolio sugar content (June 2018)



Source: Candriam research and estimates

IMPACT ON COMPANY BUSINESS PERFORMANCE

Those companies with a high or medium sugar factor, combined with worst geographic exposure (sales in the three highest-risk regions we have identified: Americas, Europe and Australia), are most at risk of seeing their profitability impacted by sugar regulations and changing consumer trends. Unsurprisingly we find that these are mostly beverage manufacturers. However confectionary companies might become exposed as regulations expand to encompass non-liquid food products.

This is valuable information in the context of **Candriam ESG risk portfolio assessment: we looked at Candriam equity exposure to these companies** as a percentage of overall equity Food & Beverage holdings. Candriam has **moderate exposure to the worst-positioned companies (Lindt, Coca Cola, Monster), and moderate exposure to average-risk companies (Danone, PepsiCo).**

When companies with high sugar risk are held in our portfolios, including non-SRI processes, we advise and support our portfolio manager in three ways, through analysis and engagement:

- Analysis I: How does the company compare to its peers in terms of managing the emerging sugar risk? For this purpose it is helpful to compare companies within subcategories (mixed food, beverages, see charts below).
- Analysis II: Does the valuation of the company already embed the sugar risk? Do we need to make changes to our valuation model to reflect this issue? Or reduce our position?
- Engage: By engaging with management, we can assess a company's' strategy to address and mitigate the sugar risk.

ANALYSIS I: HOW DOES THE COMPANY COMPARE TO ITS PEERS? *Intra-category comparison*

Beverage and confectionary companies will, and should tackle the sugar challenge differently from the way processed and general food producers will. For instance, confectionary companies often point to the indulgence

factor of their products. Consumers are aware of the sugar content of these products but consume them on an exceptional basis, as a treat. For this reason, comparing companies within sub-categories might be more relevant.

Chart 8: Mixed food companies — sugar factor (June 2018)

Depending on their product portfolio, food companies show various sugar content profiles.

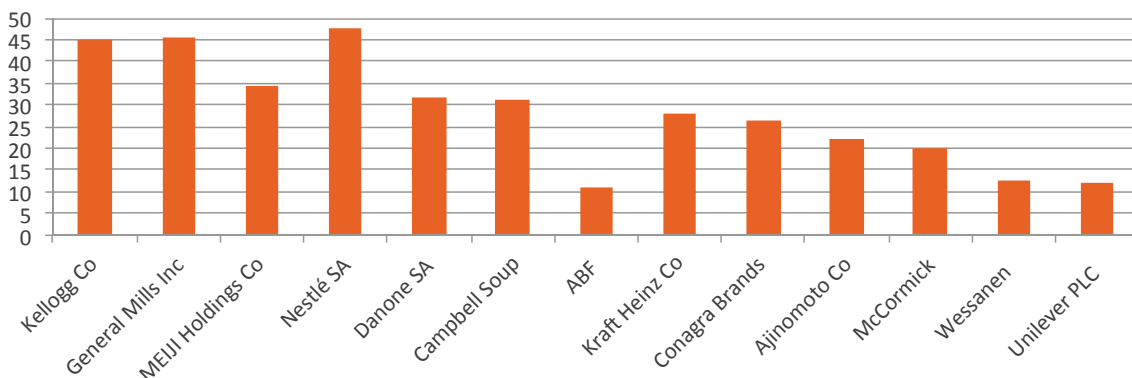
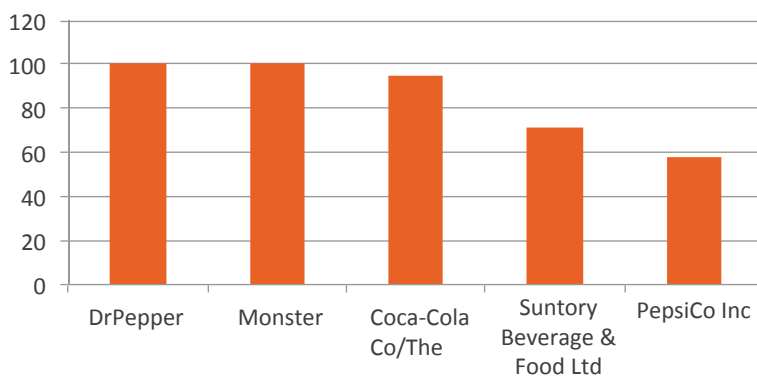


Chart 9: Beverage companies — sugar factor (June 2018)

Within the beverage sector, some drinks manufacturers have begun to address the sugar issue by diversifying their portfolio away from sodas – for example, PepsiCo, and Suntory.



A few acquisitions in the healthy food space

- PepsiCo: Bare Foods (May 2018) – natural organic
- Unilever: Mae Terra (October 2017) - organic food snacks
- Nestlé: Sweet Earth (September 2017) – plant-based foods
- General Mills : Annie’s (September 2017) – natural and organic food
- Campbell: Pacific Foods (July 2017) – organic
- Givaudan: Vika (July 2017) – natural dairy ingredients soup
- Danone : White Wave (April 2017) – plant based milk products
- Glanbia: Amazing Grass (February 2017) – plant based organic and non-GMO brands
- Lotus Bakeries Group: Urban Fresh Foods (December 2015) – fruit snacks

New consumer tastes, new business strategies

Although the food industry talks about reformulating products, another winning strategy is diversifying into healthier products. Food categories with health and functional attributes such as energy bars, gluten-free, organic, fruit snacks, and others, are growing at a much faster rate than high-sugar or conventional categories. Healthy snacks, for instance, grew at 7% in 2014-2015, while ‘conventional’ snacks grew by 5%, according to Euromonitor. A new packaging strategy is also a dynamic tactic, for example an increasing focus on smaller sizes. Some research estimates the global health and wellness food market to grow at a compound rate of 6%.

Low-sugar food is not a reference category as such, but the healthy and natural range provides us with a good proxy. Some food companies have begun to migrate their product portfolio towards healthy options, mainly through acquisitions. Healthy food companies have traditionally been more transparent on ingredients and avoided hidden ingredients such as sugar. Hence they can be seen as solution provider

R&D spending, a proxy for reformulation? We see reformulation as a key business strategy in the sector to mitigate the costs of sugar taxes and risks. Further clarity on companies' R&D strategies to revamp their portfolio towards healthy foods will be needed.

Sugar alternatives. Companies have developed sugar-free alternatives for decades – mainly for carbonated drinks. Although these were mostly artificial, such as aspartame, the trend is now towards natural reduced-

calorie sweeteners such as stevia, a plant leaf extract. Artificial sweeteners such as aspartame have suffered from a negative health perception. Coca-Cola launched its first version of stevia-based cola, Coca-Cola Life, in 2013, and a second version with zero sugar (100% stevia sweetener) in 2018. This was motivated by consumer rejection of controversial artificial sweeteners such as aspartame. Although it remains a niche product, analysts think Coca-Cola Life will gain traction as consumers build their awareness of stevia.

ANALYSIS II: DOES THE VALUATION EMBED THE SUGAR RISK?

Candriam's 'traditional' financial analysis framework consists of multiple analytical stages. ESG analysis is particularly useful in assessing quality of management.

Quality of management is widely viewed in all fundamental analyses as an important factor in company valuation.

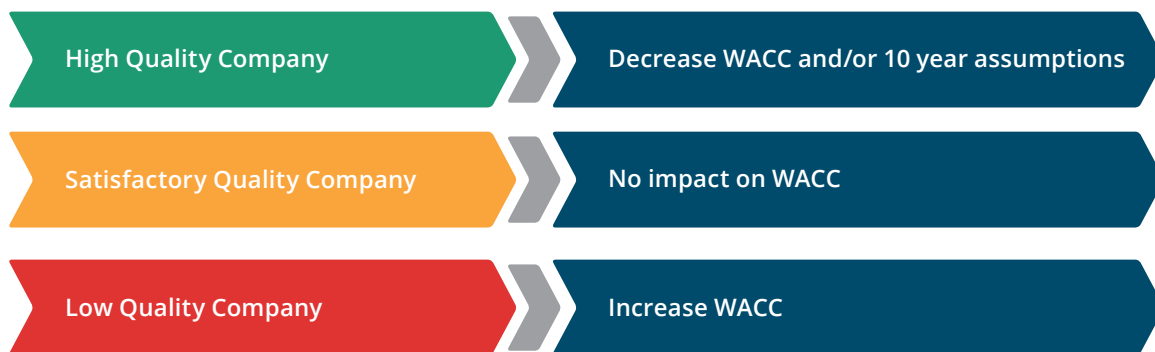
Chart 10: Candriam framework for equity analysis



For equities, our view is that the valuation of a company's ESG credentials and quality of management may be

reflected through the discount factors used in the DCF valuation model of this stock:

Chart 11: Potential valuation adjustments



The Suntory and Nestlé case studies following on pages 23 and 24 illustrate the role of our ESG analysis in the analysis of these companies, and in our share price

valuations, within our traditional investment research framework.

ENGAGING WITH FOOD AND BEVERAGE COMPANIES ON SUGAR

Analysis consists of estimates: Our analysis includes estimates of company revenue from different food categories, and estimates of sugar content in each category. Most company disclosures are insufficient to precisely assess the sugar content of their product range. This raises many questions about management awareness and their ability to address the sugar issue. This should be done either through product reformulation,

product diversification, or portfolio strategy, as well as through more responsible marketing and labelling practices. We engage with our investee companies on sugar content and risks to better understand their strategies in this new consumer and regulatory environment. As long-term and responsible investors, we also want to encourage our investee companies to implement the right business strategy regarding nutrition.

COMPANY ENGAGEMENT PLAN

- **Management views on consumer and regulatory trends regarding sugar**
- **Board level consideration of the sugar issue**
- **Risk and opportunity analysis**
- **Disclosure and communication of company portfolio**
 - Granular approach to company products and portfolio
 - Geographic/regional/local product segmentation
- **Sugar risk management**
 - Policies to reduce amounts of sugar in food recipes, targets, achievement/performance monitoring
 - Product or region-specific policies and systems
- **Nutrition-specific disclosure**
 - Type and volumes of sugar used, portfolio-wide and by category
 - Sugar cost as a percentage of raw materials and of cost of goods sold
 - Proportion of sugar in product recipes, e.g. sugar per gram and per litre
 - Proportion of sales from products which meet WHO or other widely-accepted dietary and sugar guidelines
 - Transparency on lobbying activities – the sugar industry has spent an estimated €21.3m euros annually to lobby the European Union on sugar regulation²⁰
- **Strategy**
 - Portfolio transformation : acquisitions, divestments, strategic decisions
 - R&D spend related to healthy trend and less sugar, reformulation costs ahead of sugar regulations
 - Transparency, labelling of products : group policies and objectives
 - Marketing practices, responsible promotion policy and practices (size of portions, advertising targeting children, dietary guidelines communication etc.)

²⁰ A spoonful of sugar, how the food lobby fights sugar regulation in the EU, https://corporateeurope.org/sites/default/files/a_spoonful_of_sugar_final.pdf

Chart 12: Results of Candriam engagement with food and beverage companies (April 2019)

Company name	Contact	Response	Our sugar management assessment	Position on the sugar risk map
Nestlé SA	yes	yes with links to written responses	Ok	Medium Risk
Reckitt Benckiser Group PLC	yes	yes with written responses	Good	Ok
Unilever PLC	yes	Response through collaborative engagement	Ok	Medium Risk
Danone SA	yes	yes, with follow-up call	Ok	Medium Risk
Kellogg Co	yes	Response through collaborative engagement	Ok	At risk
Coca-Cola Co/The	yes	no response to Candriam as of April 2019		At risk
PepsiCo Inc	yes	no response to Candriam as of April 2019		At risk
Ajinomoto Co Inc	yes	yes with written responses	Ok	Ok
Kraft Heinz Co/The	yes	no response to Candriam as of April 2019		Medium Risk
General Mills Inc	yes	yes, with follow-up call	Does not anticipate the risk adequately	At risk
Conagra Brands Inc	yes	no response to Candriam as of April 2019		Medium Risk
Campbell Soup Co	yes	yes, with follow-up call	Good	Medium Risk
Suntory Beverage & Food Ltd	yes	yes, with follow-up call	Good	Medium Risk
McCormick	yes	no response to Candriam as of April 2019		Medium Risk
ABF	yes	yes with written responses	Does not anticipate the risk adequately	Medium Risk
Barry Callebaut	yes	yes with written responses	Ok	At risk
Lindt	yes	yes with written responses	Ok	At risk
Wessanen	yes	yes, with follow-up call	Good	Ok
DrPepper	yes	yes with written responses	Does not anticipate the risk adequately	At risk

GOOD
NEUTRAL
ACTION NEEDED

We have assessed the ability of companies to mitigate the risks of the sugar debate. Some have elaborated clear strategies to mitigate the sugar risks through product reformulation and responsible advertising or labelling practices, a few are even taking up the business

opportunities emerging from healthy consumer trends.

However we have found that the worst-positioned companies on the sugar issue map are also the least engaged on the risks.

A range of responses:

- **Lack of investor engagement on the issue:** companies which have not replied to a dialogue request despite being highly exposed to the sugar issue
 - An investor concern from a quality of management point of view: as an emerging risk we expect companies to open dialogue to discussion on sugar, e.g. PepsiCo.
 - Highly-exposed companies lacking a sugar policy, or lacking details on sugar reduction programmes, e.g. Kellogg and Coca-Cola.
- **Lack of acknowledgment of the sugar risk:** when very exposed to the sugar issue companies may not recognise it
 - Do not perceive sugar as an individual risk worth its own mitigation plan
 - Remain confident they can adapt to consumer trends as they arrive
- **Product should be treated differently:** companies might acknowledge there is an issue with but their products remain acceptable treats
 - Chocolates will remain a sweet treat in a balance diet, meant to be for occasional consumption
 - Premiumisation and strong market differentiation are main strategies to preserve the brand/product value despite new healthy consumer trends, for example, Lindt.
 - Often developing the low sugar opportunities at the same time; innovation such as low sugar or sugar free chocolate: Barry Callebaut, Lindt.

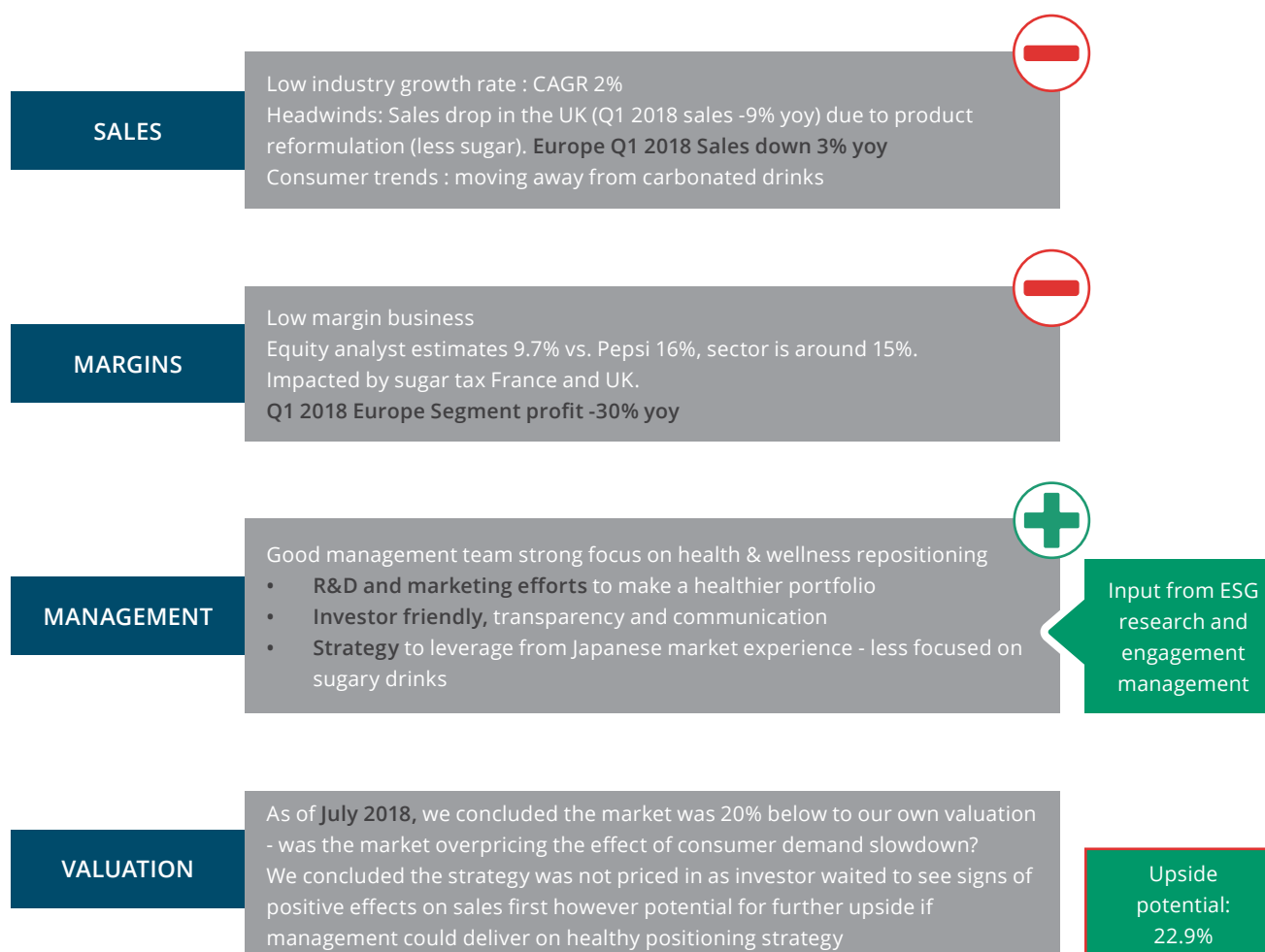
CASE STUDIES

CASE STUDY: SUNTORY

Suntory case study: July 2018

Suntory is a Japanese food and beverage company. Sales and margins have been down due to sugar regulatory pressure on sodas, as well as a slow long-term growth.

Business strategy to revamp product portfolio towards healthy products. ESG analysis helps assessing the potential upside on the share price.



Input from ESG research and engagement management

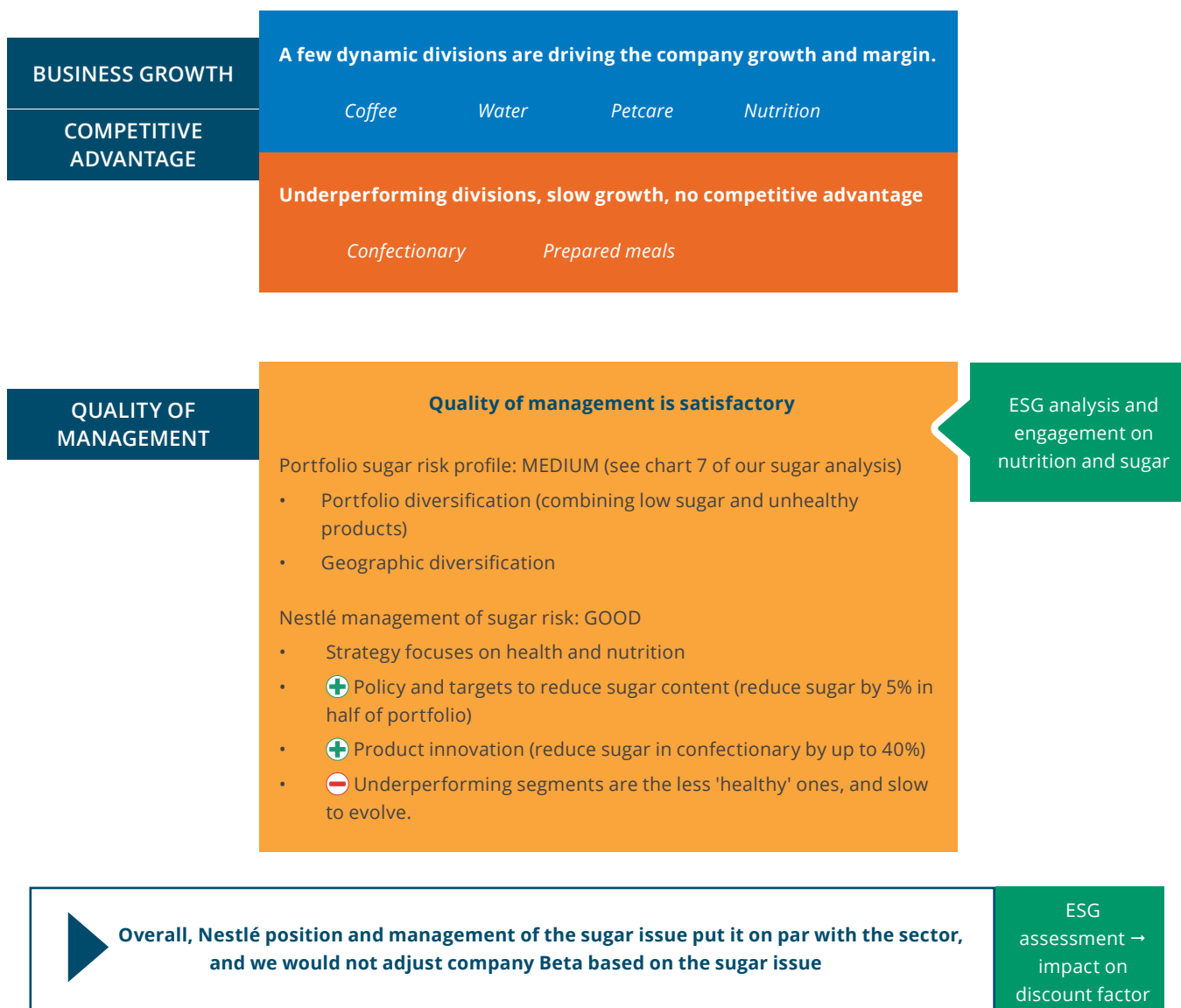
Warning: This case study dated as of **July 2018** prepared by Candriam is not intended to be relied upon as a forecast, research or investment advice, and is not an investment recommendation, offer or solicitation to buy or sell any securities or to adopt any investment strategy. The figures and opinions set forth herein may change as subsequent conditions vary. This material may contain 'forward looking' information that is not purely historical in nature. There is no guarantee that any forecasts made will come to pass. Reliance upon information in this material is at the sole discretion of the reader. Past performance is not a reliable indicator of current or future results and should not be the sole factor of consideration when selecting a product or strategy.

CASE STUDY: NESTLÉ

Nestlé case study: November 2018

ESG analysis helps identifying business risks related to Nestlé’s food and drinks product portfolio, and how management is addressing those risks. Here we focused

on the sugar risk. The ESG assessment is embedded in company valuation through the discount factor used in the financial valuation model.



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CONCLUSION

As consumers become more informed on the risk of sugar consumption, and regulators more inclined to regulate, the entire industry must either adapt, or suffer. Our analysis shows that companies are unequally exposed to, and unequally prepared to face these changes. However achieving this level of understanding, examining both business risks and opportunities, requires analysts to take additional steps through analysing company product portfolios. As more organisations analyse the nutrition profile of the companies in which they invest, increased demand for transparency should ease the work of investors. A good example of this is the Access to Nutrition Index, providing for the first time in 2018 a product profile for each company in the index. This independent non-profit assesses the nutritional quality of products using two different nutrient profiling systems, the Health Star Rating and the WHO Regional Office for Europe Nutrient Profile Model.

Sugar is only one aspect of the long-term health and nutrition trend. Beyond sugar, there is increasing demand for product and ingredient transparency, and labelling levels of bad and good ingredients. Consumers and regulators also want progress on the sustainability of products and ingredients. This is only the beginning of an industry transformation.

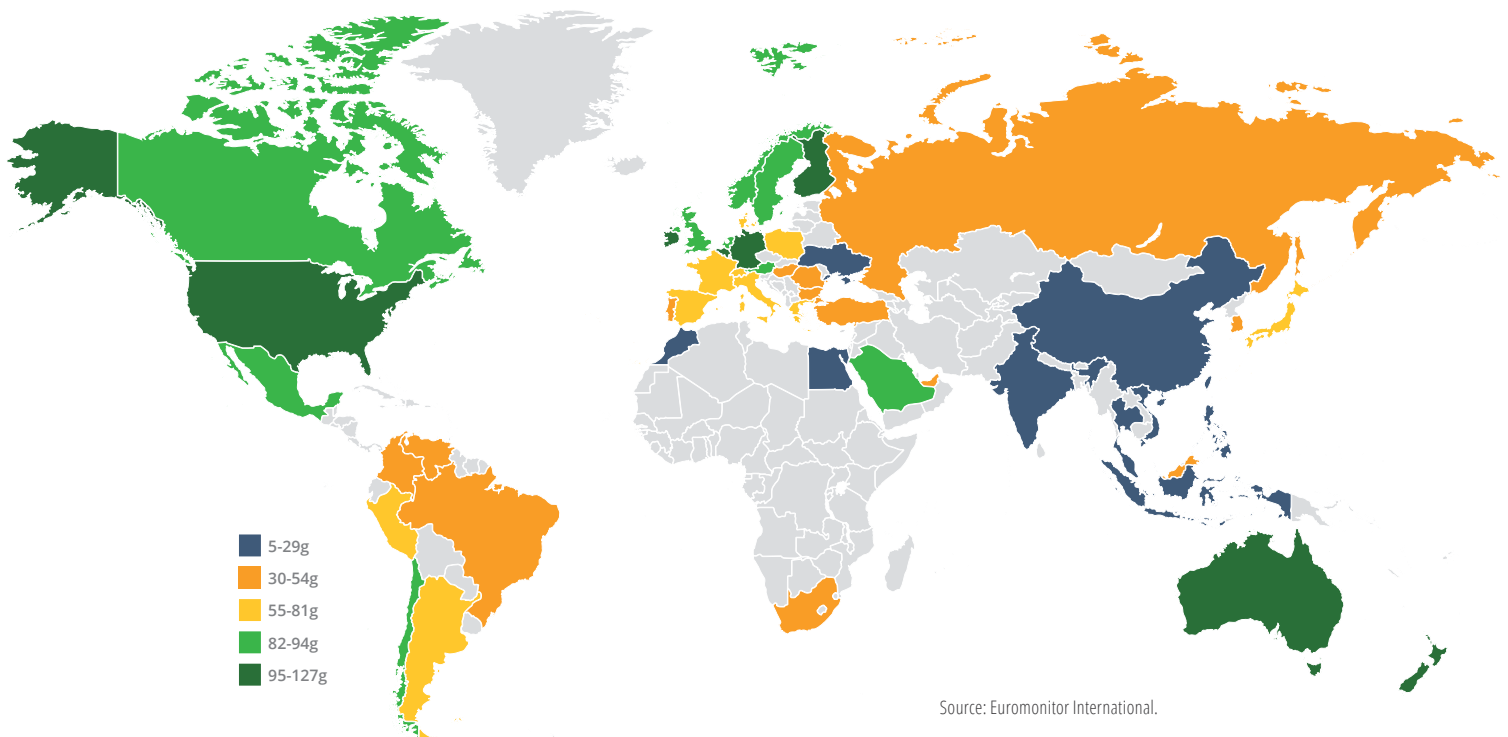
Although consumer awareness on nutrition is higher in developed markets, emerging countries will catch up in future as the healthcare issue, and costs, grow. Positioning for the trend towards healthier foods, through lowering sugar, salt and fat content has become a main strategic business challenge for the industry. By continuing to offer products detrimental to human health, companies will put their performance at risk through damaged brand reputation, lower profitability and market-share loss. Our analysis will continue to focus on this issue developing further analytical tools informing our investment decisions, as well as encouraging companies towards better practices.

APPENDICES

SUGAR CONSUMPTION AROUND THE WORLD

How much sugar is the average global consumer buying?

Sugar purchased, per capita consumption in 2015



72g

Average purchase of sugar per capita per day, globally in 2015

2%

Annual growth rate of sugar purchased over 2015-2020

47%

of global respondents look for foods that have limited or no added sugar

NATIONAL AND LOCAL SUGAR TAXES

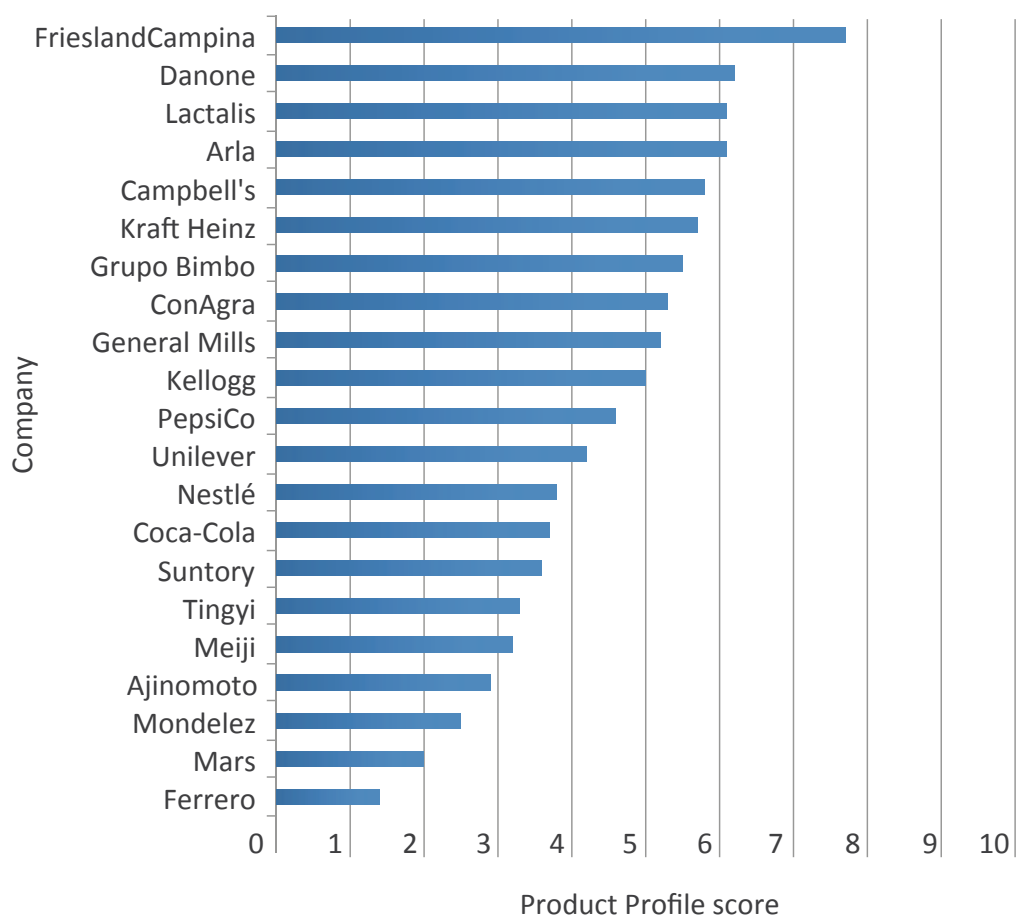
Country	Region	Date of introduction	Regulation	normalisation	€ equivalent
UK	Europe	2018	18 pence per litre on soft drinks with more than 5 grams of sugar per 100ml, and 24 pence per litre on soft drinks with higher levels	£24p/L	€27c/L
France	Europe	2012	tax on SSBs, plans to increase the tax to 20 euros per hectoliter for drinks that contain more than 11g of sugar per 100ml	€20c/L	€20c/L
Portugal	Europe	2017	tax on soft drinks: 16.46 euros per 100 liters on soft drinks with more than 80 grams of sugar per litre, and a tax of 8.22 euros per 100 liters on soft drinks with lower levels of sugar	€16.46c/L	€16.46c/L
Spain	Europe	2017	Catalonia: tax on sugary soft drinks. Levy fr drinks w/ btw 5 and 8 gramme sof sugar every 100mL (8p/L) and drinks with >8 grammes of sugar every 100ML (12p/L)	€12c/L	€12c/L
Belgium	Europe	2016	Increased Tax on sweetened drinks to 0.068 euros per litre	€6.8c/L	€6.8c/L
Finland	Europe	2011	Tax on sweets and ice cream 0.95 euros per kilogram. European Commission said it was unfair as imported sweets were also subject to import duties. So Finland scrapped tax candy tax in 2017; a tax on soft drinks remains in place €0.11 per litre of the product	€11c/L	€11c/L
Hungary	Europe	2011	Tax on food with high levels of sugar, fat and salt along with higher tariffs for soft drinks in 2011. then reviewed in 2012: 200 HUF/litre for syrups or concentrates for soft drinks and 7HUF/litre for other soft drinks	HUF7/L	€22c/L
Ireland	Europe	2018	plans to introduce a tax on sugary drinks of 30 cents per litre on beverages with more than 8 grams of sugar per 100ml, and 20 cents per litre on beverages with 5-8 grams of sugar per 100ml	€30c/L	€30c/L
Estonia	Europe	2018	From 1 January 2018, the legislation will introduce a tax on nonalcoholic beverages : from 10 cents/L for product with 5-8g sugar per 100ml to 30c /L for product with higher sugar content	€30c/L	€30c/L
Mexico	Americas	2014	1 peso per litre tax in SSBs	1 peso /L	€45c/L
US (Berkeley etc.)	Americas	2015	Berkeley, California : tax on SSBs (2015) US\$0.01 per fluid ounce other cities have began to to tax soft drinks too:Seattle, Washington: tax on soft drinks Philadelphia, Pennsylvania: tax on soft drinks Boulder, Colorado: tax on soft drinks Oakland, California: tax on soft drinks	\$34c/L	€30c/L
Chile	Americas	2014	ad valorem tax on sugary drinks, increased it in 2015 to an 18% ad valorem tax on drinks with more than 6.25 grams of sugar per 100 ml. 10% tax on beverages with lower levels of sugar	ad valorem 18%	ad valorem 18%
Ecuador	Americas		SSB tax of US\$0.18 per 100g of sugar per litre	\$18c/L	€16c/L
Barbados	Americas	2015	10% excise tax on SSBs	ad valorem 10%	ad valorem 10%
Dominica	Americas	2015	10% excise tax on SSBs and food with high levels of sugar, including chewing gum and chocolate in 2015	ad valorem 10%	ad valorem 10%
Brunei	Asia/Oceania	2017	US\$0.29 per litre tax on soft drinks	\$29c/L	€25c/L
Thailand	Asia/Oceania	2017	taxes on sugar-sweetened beverages range from US\$0.15 to US\$1.33 per litre	\$15c to \$1.33/L	€13c to €1.17/L



Country	Region	Date of introduction	Regulation	normalisation	€ equivalent
Laos	Asia/ Oceania		5%-10% ad valorem tax on soft drinks, soda, fruit juices and energy drinks	10% ad valorem	10% ad valorem
Cambodia	Asia/ Oceania		10% ad valorem tax on imported beverages	10% ad valorem	10% ad valorem
Vietnam	Asia/ Oceania	2019	special sales tax on soft drinks in 2019	10% special consumption tax rate	10% special consumption tax rate
Kiribati	Asia/ Oceania	2014	40% tax on sweetened drinks	ad valorem 40%	ad valorem 40%
Tonga	Asia/ Oceania		tax on SSBs of 1 Pa'anga per litre	1pa'anga/L	€39c/L
Vanuatu	Asia/ Oceania	2015	tax on SSBs of 50 Vatu per litre	50 Vatu/L	€38c/L
SriLanka	Asia/ Oceania	2017	Latest budget put in place a 50-cent tax on each gram of sugar in soft drinks, which took effect in early November		
South Africa	Africa/ Middle East	2018	tax on sugary beverages. 2.1 cents per gram of the sugar content that exceeds 4g per 100ml. The Healthy Leaving Living Alliance estimates that on a litre of sugary soda the tax will be approximately R1.39 (SU 12c)	R1.39/L	€8c/L
Mauritius	Africa/ Middle East	2013	tax on soft drinks, extended the tax in 2016 to all sugar-sweetened nonalcoholic beverages	ad valorem 50%	ad valorem 50%
GCC members	Africa/ Middle East	2017	50% advalorem excise on carbonated drinks by the end of 2017	ad valorem 50%	ad valorem 50%
Under discussion					
Philippines	Asia/ Oceania	2018	Sugar-Sweetened Beverages (SSB) bill proposed a tax of PHP10 per litre on SSBs including powdered juices, energy drinks and soft drinks. The rate will be increase by 4% each year thereafter	PHP10 / L	€16c/L
Australia			Health experts keep calling for a sugar sweetened beverages (SSB) tax		
Canada	Americas	2018/2019	Northwest Territories government announced plans to introduce a soft drink tax in the 2018/2019 budget year. Montreal City Council passed a motion calling on the federal government to impose an excise tax on sugar-sweetened beverages.		
India	Asia/ Oceania	2018	Newly implemented GST plan = heavy 40% tax rate for sweetened aerated beverages vs. 12% for fruit pulp or juice	ad valorem 40%	ad valorem 40%
New Zealand	Asia/ Oceania	2018	Two-third of New Zealanders support a tax on sugary drinks: survey by Auckland University: 67% said they either strongly or somewhat agreed with such a tax		
Fiji	Asia/ Oceania		Plans to increase taxes on SSBs by 15% to 35 cents per litre (existing 5c/L)	FJD 5-35c/L	€2-14c/L

ACCESS TO NUTRITION INDEX PRODUCT PROFILE

In its Product Profile 2018 analysis the ATNI assessed 23,013 products. Less than a third came up as healthy (meaning a Health Star rating of 3.5 or higher), whilst only 14% met the WHO EUOR criteria for marketing to children.



Source: ATNI 2018. Companies' overall Product Profile score is derived by weighting average Health Star Rating (HSR) generated by The George Institute for each product category; multiplied by their sales in 2015 of those categories in India using data from Euromonitor.

SOURCES OF SUGAR IN THE DIET

Harvard Health article 'The sweet danger of sugar'

Where does your added sugar come from?

<u>Food group</u>	<u>Proportion of average intake</u>
Soda/energy/sports drinks	42.20%
Grain-based desserts	11.90%
Fruit drinks	8.50%
Dairy desserts	5.50%
Candy	5.00%
Ready-to-eat cereals	2.90%
Sugars/honey	4.10%
Tea	3.80%
Yeast breads	2.30%
Syrups/toppings	1.40%

Source: Harvard Health Publishing / Harvard Medical School, CDC, National Health and Nutrition Examination Survey, 2005–06

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